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[See original for title and abstract in English (and French). However, note that in the English abstract "monobloc" should be "single-unit" and "rotular" should be "patellar."]

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Prosthetic Assembly for the Knee Joint

The subject of the invention relates to the technical sector of medical sciences.

Using a prosthesis with the intention of reconstructing the joint between the femur and tibia is known for certain knee lesions. Generally, prostheses of this type are limited in number; essentially one can distinguish between the single-unit trochlear-bicondylar prosthesis, patellar prosthesis and unicompartmental prosthesis. This limitation in number and shape for prostheses leads to certain inconveniences because, depending upon the lesion to be treated, only the prosthesis having the closest type can be used, so that the results obtained can not be deemed satisfactory.

Effectively, either the prosthesis is undersized for the knee treatment to be performed or the prosthesis is oversized for the treatment to be performed and therefore likely to affect the undamaged areas. For example, unicompartmental prostheses are not shaped to be adapted to either the medial or lateral condyle. Similarly, internal and external trochlear-condylar prostheses do not exist.

Having posed the problem this way, the goal set for the invention is to split, and adjust the knee into several parts, corresponding to different possible lesions, and to create for each of these parts a prosthesis particularly well-suited to it in shape and size.

Towards this goal, a new single-unit trochlear-bicondylar prosthesis has been made whose shapes and profiles are designed to be adaptable to the knee's anatomy, notably which of the femur considered in light of a representative sample. From this base prosthesis, which is suitably equipped with anchoring points, the following prostheses can be made:

- an external trochlear-condylar prosthesis
- an internal trochlear-condylar prosthesis
- a mono-external prosthesis
- a mono-internal prosthesis

– a patellar prosthesis

Therefore, a set was completed including six different types of prosthesis for each knee, each corresponding to the lesion to be treated. In a preferred manner, each type is available in three sizes: large, small, and medium.

The invention is presented below in more detail with the help of drawings, which represent the shapes and profiles of each type of prosthesis; it is emphasized that the prostheses illustrated correspond to the right knee at 1:1 scale and correspond to the large size.

- Figures 1, 2, 3 and 4 relate to the single-unit trochlear-bicondylar prosthesis; Figure 1 is the anterior view; Figure 2 the profile view; Figure 3 the posterior view; and Figure 4 the top view corresponding to Figure 2.

– Figures 5, 6, 7 and, 8 relate to the internal trochlear-bicondylar prosthesis; Figure 5 is the anterior view; Figure 6 is the profile view; Figure 7 is the posterior view; and Figure 8 is the top view corresponding to Figure 6.

– Figures 9, 10, 11 and, 12 relate to the external trochlear-bicondylar prosthesis; Figure 9 is the anterior view; Figure 10 is the profile view; Figure 11 is the posterior view; and Figure 12 is the top view corresponding to Figure 10.

– Figures 13, 14, 15 and, 16 relate to the mono-external prosthesis; Figure 13 is the anterior view; Figure 14 is the profile view; Figure 15 is the posterior view; and Figure 16 is the top view corresponding to Figure 14.

- Figures 17, 18, 19 and, 20 relate to the mono- internal prosthesis; Figure 17 is the anterior view; Figure 18 is the profile view; Figure 19 is the posterior view; and Figure 20 is the top view corresponding to Figure 18.

– Figures 21, 22, 23 and 24 relate to the patellar prosthesis; Figure 21 is the anterior view;

Figure 22 is the profile view, Figure 23 is the posterior view; and Figure 24 is the top view corresponding to Figure 22.

The single-unit trochlear-bicondylar prosthesis illustrated in Figures 1 to 4 includes a part (1) which operates as the patellar shield, extended in a perpendicular or nearly perpendicular plane by semi-lobe sections (2) and (3) separated by an indentation (4) allowing a part (5) common to said lobes (2) and (3) to remain. In the case of a right knee, the lobe (2) has a cross-section shape corresponding to the average radius of curvature of the medial condyle. Inversely, the lobe (3) is shaped in cross-section to correspond to the average radius of curvature of the lateral condyle.

The internal trochlear-condylar prosthesis (Figures 5, 6, 7 and 8) includes the patellar shield (1) extended on only one side, in a perpendicular or nearly perpendicular plane, by the lobe (2) whose cross-sectional profile corresponds to the average radius of curvature of the medial condyle. Opposite from the lobe (2), the common part (5) is beveled (6) at a fixed angle corresponding that the normal patellar path.

The external trochlear-condylar prosthesis (Figures 9, 10, 11 and 12) is similar to the internal trochlear-condylar prosthesis; the only difference lying in the layout of the lobe (3) and the bevel (7), which is reversed.

The patellar prosthesis (Figures 21, 22, 23 and 24) is made from the condoler shield (1) extended in a perpendicular or nearly perpendicular plane by the common part (5) whose lateral extremities (8) and (9) are indented to correspond respectively to the medial and lateral patellar path.

In a significant manner, the length of the patellar shield (1) is fixed to receive all the possible anomalies (high or low patella).

The mono-external prosthesis shown in Figures 13, 14, 15 and 16 includes only the lobe (3) whose cross-sectional profile corresponds to the lateral candle's average radius of curvature.

In reverse, the mono-internal prosthesis shown in Figures 17, 18, 19 and 20 includes only the lobe (2) whose cross-sectional profile corresponds to the medial condyle's average radius of curvature.

Significantly, each prosthesis has anchoring points (10) that are either direct or added on, depending on the material making it up. These points are suitably positioned extending past the inner sides of the prosthesis to resist the different pressures to which the prosthesis is subject.

According to the invention, for each type of prosthesis, the points (10) have the same layout and same shape. Two points are formed extending from the inner face of each of the lobes (2) and (3), whereas one point is formed by extending from the inner face of the common part (5) relative to the patellar shield. The length of the patellar shield's point is greater than that of the points relative to the lobes (2) and (3).

The anchoring points for lobes (2) and (3) are separated and potentially extended laterally by braced webs (11).

According to the invention, six types of prosthesis have therefore been created for each knee, each type being preferably made in three sizes, for a total of 36 prostheses.

The invention is in no way limited to its methods of application nor to the construction means of its various parts; it has specifically been indicated, on the contrary, that it includes all variants.

CLAIMS

-1- Prosthetic assembly for knee joint, characterized in that it includes for each knee, six type of prostheses specially adapted to the lesion to be treated, specifically:

- one base single-unit trochlear-bicondylar prosthesis whose shapes and profiles are designed to be suited to the knee's anatomy, notably to the femoral condyles.

- an external trochlear-condylar prosthesis, an internal trochlear-condylar prosthesis, a patellar prosthesis, a mono-external prosthesis, a mono-internal prosthesis, each of said prostheses having, according to its type, one or several parts of the same shape and profile as those of the base trochlear-bicondylar prosthesis.

-2- Assembly according to Claim 1 wherein the single-unit trochlear-bicondylar prosthesis is characterized by the particular anatomical shape illustrated in Figures 1 to 4 of the drawings, according to which it includes a part (1) which serves as the patellar shield extended in a perpendicular or nearly perpendicular plane by two shaped lobes (2) and (3) separated by an indentation (4) allowing a common part (5) to remain between said lobes; the lobe (2) is shaped in cross-section to correspond to the average radius of curvature of the medial condyles, whereas the lobe (3) is shaped in profile to correspond to the average radius of curvature of the lateral condyles.

-3- The assembly according to Claims 1 and 2 together, wherein the internal trochlear-condylar prosthesis is characterized by the specific anatomical shape illustrated in Figures 5 to 8 of the drawings according to which it includes the patellar shield (1) extended on one side only in a perpendicular or nearly perpendicular plane, by the lobe (2) whose cross-sectional profile corresponds to the average radius of curvature of the medial condyle;

opposite said lobe, the common part (5) is beveled (6) at a fixed angle corresponding to the normal patellar movement.

-4- The assembly according to Claims 1 and 2 together wherein the external trochlear-condylar prosthesis is characterized by the specific anatomical shape illustrated in Figures 9 to 12 of the drawings, according to which it includes the patellar shield (1) extended on one side only in a perpendicular or nearly perpendicular plane, by the lobe (3) whose cross-sectional profile corresponds to the average radius of curvature of the lateral condyle; opposite said lobe, the common part (5) is beveled (7) at a fixed angle corresponding to the normal patellar movement.

-5- Assembly according to Claims 1 and 2 together wherein, the patellar prosthesis is characterized by the particular anatomic shape illustrated in Figures 21 to 24 of the drawings, according to which it includes the patellar shield (1) extended in a perpendicular or nearly perpendicular plane by the common part (5) whose lateral extremities (8) and (9) are beveled to correspond respectively to the inner and outer patellar path.

-6- Assembly according to any of Claims 2, 3, 4 and 5, wherein the length of the patellar shield (6) is designed to receive all possible anatomies.

-7- Assembly according to Claims 1 and 2 together wherein the mono-external prosthesis is characterized by the particular anatomical shape illustrated in Figures 13 to 16 of the drawings, according to which it includes only the lobe (3) whose cross-sectional profile corresponds to the lateral condyle's average radius of curvature.

-8- Assembly according to Claims 1 and 2 together, wherein the mono-internal prosthesis is characterized by the particular anatomical shape illustrated in Figures 17 to 20 of the drawings, according to which it includes only the lobe (2) whose cross-sectional profile corresponds to the medial condyle's average radius of curvature.

-9- Assembly according to any one of Claims 2 to 8 wherein each type of prosthesis has anchoring points (10) extending past its inner face, suitably positioned to resist the different pressures exerted.

-10- Assembly according to Claim 9 wherein for each type of prosthesis the points (10) have the same shape and same layout, both points being formed extending past the inner face of each of the lobes (2) and (3), while a point is formed extending past the inner face of the common part (5).